

# IMPLEMENTATION OF TQM PILLARS IN A MANUFACTURING FACTORY: AN EMPIRICAL CASE STUDY

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## Abstract

*The process of detection and elimination of errors on a continuous basis from any system is known as TQM. This helps in improvement of productivity, efficiency, cost reduction by improving the methods and minimizing waste materials. This study aims at identifying the basis pillars in RMG industry through application of TQM principles. RMG is the highest productive industrial sector in Bangladesh economy and improvement in the product quality will have direct effect on the economic stability. Tools such as flow charts, Pareto charts, Check sheets, Cause & Effect diagrams, Histograms and scatter diagrams are utilized from variety of industries in Bangladesh to analyze the data collected. The outcome shows that the process has helped in elimination and reduction in waste scrap materials. This has also help reducing the costs and enable the organization to enhance the utilization of available resources without further investment.*

**Keywords:** *TQM, Quality; Rework, Quality Improvement; Ready-Made Garment (RMG); Defect; TQM Pillars*

**Abbreviations:** Nil



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## INTRODUCTION

Total Quality Management (TQM) is a holistic approach to the management of the entire organization. The process focuses on improving the quality of the products of a company, including goods and services, by continuously enhancing internal practices. The standards set in the TQM approach that represent internal priorities as well as any industry standards currently in place. TQM is considered a customer-focused process that aims to improve business operations continuously. It seeks to ensure all associated employees work toward the common goals of enhancing product or service quality, as well as strengthening the procedures that are in place for production. William Deming's work had a major impact on Japanese manufacturing, developed TQM (Miller & William Johnson. 1996). U.S. Naval Air Systems created the term TQM which stands for "Total Quality Management." A company uses TQM as a long-term strategy for achieving customer satisfaction. Total Quality Management requires all staff of the organization to improve the products, processes, and services. All staff of the organization for improving the processes, products, and services. All staffs, no matter what role, are responsible for the quality and quality assurance. The entire business culture is TQM when done correctly (Hake &, Chris, ed. 1991). TQM views a company as a collection of processes. It maintains that organizations must seek to continuously improve these processes by incorporating the knowledge and experiences of workers. The simple goal of TQM is, "Do the right things, right the first time, every time." TQM is infinitely adaptable and variable.

The application of TQM has carried over to all aspects of the organizational workings and is identified as a general management tool now (Hashmi & Khurram, 2007). Many companies have adopted TQM principles in their operations on the basis that it is the most appropriate strategy to increase productivity and gain a competitive advantage. But still companies are finding it hard to upkeep with the standards TQM principles since the advantages obtained exclusively from application of TQM have not been examined in isolation in organizational and management research (Powell, T.C. 1995). The practice of TQM principles require changes to all three levels of the organizational operations that include technology, people and structure.

## SIGNIFICANCE OF THE STUDY

This exploration result will contribute essentially to advance and encourage TQM adjustment in the RMG division of Bangladesh. The administration offered by RMG organizations in Bangladesh is agreeable to the clients. Be that as it may, as far as expanding rivalry and the presentation of new guidelines and guidelines, this investigation is noteworthy for Bangladesh instant pieces of clothing organizations in the worldwide business setting. The need of this investigation can be defended. One,

to guarantee quality execution, each association needs to build up a quality domain. Two, the primary reason for the association is for the most part to variegate the serious market and furthermore help up the fare and benefit through expanding quality execution. Three, Organizations need to include their every representative just as their promise to adapt up to guaranteeing quality execution and changing economic situations. Four, for business achievement and supportability, guaranteeing consumer loyalty is the precondition. Five, it was unequivocally suggested the significance of gathering work and interdisciplinary research. In addition, governments and different associations will likewise profit by the discoveries of this examination that are right now actualizing TQM approaches, just as those trying to set up TQM rehearses inside their frameworks to accomplish supportable upper hands and to improve their presentation for their organizations.

The fundamental target of our investigation is:

1. To discover fundamental columns which are required for actualizing TQM in Garments businesses
2. To improve efficiency and item quality.
3. To improve the nature of the piece of clothing industry of Bangladesh by executing a TQM approach.

## METHODOLOGY

Quality is a complex terminology. Quality is the price consumers willing to pay for a product. The examination of a product to improve the quality goals of a product is done. The most popular quality analysis is TQM tools (Oxford Talking Dictionary, 1998, Total Quality, 1992).

The research methodology consists of three important steps:

1. From the previous literature conducting, we identified the pillars to implement TQM in practice in our selected RMG industry.
2. Analyzing the present situation of product quality. (Define the Defects Name, Data Collection of Frequency of defects, analysis with TQM tools). Data has been collected from the selected RMG industry.
3. Finally, by implementing the Total Quality Management Approach (TQM Approach), we analyze the Improvement of product quality and productivity.

## TQM COMPONENTS AND FACTORS

TQM include various factors other than the most commonly used ones like techniques and tools in quality improvement. The literature has identified two streams in which these aspects can be categorized. One is the management systems that involve

planning, leadership and human resource (Evans, James R., & William M. Lindsay, 1999) and the other is the technical systems that is made up of technical tools (diagrams and charts etc). these are also categorized as soft and hard aspects (Gomes, I., et al. 1999). The hard aspects includes the production activity and control techniques for all the work processes that result in proper functioning of the system under the just in time philosophy along with ISO 9000 principles and other TQM tools. The whole TQM hierarchy consists of critical factors that are collection of practices, techniques and tools and methods for the implementation of these techniques and tools (Gomes, I., et al. 1999, Sitkin, Sim B., Kathleen M. Sutcliffe, & Roger G. Schroeder. 1994, Zhang, Zhihai, A. B. Waszink, & Jacob Wijngaard. 2000). The basic tools are check sheet, cause and effect diagram, histograms, control charts, scatter diagram, Pareto charts along with other management tools like arrow diagram, affinity diagram, matrix data analysis and diagram, process decision etc (José Tarí, Juan. 2005).

A set of latent variables that cannot be measured directly are used as factors identified like supplier quality management. The basis of Delphi method as used by Schroeder to come up with the theory of quality management from the research (Anderson, John C., Manus Rungtusanatham, & Roger G. Schroeder. 1994). Which has been carried out by academicians and researchers using the Dinning's 14 principles questions. The seven proposed concepts include forward looking leadership, cooperation on internal and external, administrative processes, learning, performance, continuous improvement, and customer satisfaction. The work is still not generally accepted due to the lack of a valid scale and empirical validation (Ahire, Sanjay L., & Paul Dreyfus. 2000). The two sets of critical factors for the measurement of quality management (Ahire, Sanjay L., & Paul Dreyfus. 2000, Flynn, Barbara B., Roger G. Schroeder, & Sadao Sakakibara. 1994) are proposed for reliability and validity in the sphere of industrial firms. Saraph, Jayant V., P. George Benson, & Roger G. Schroeder. (1989) developed a quality management measurement tool which has been corroborated by (Badri, Masood A., Donald Davis, & Donna Davis. 1995, Black, Simon A., & Leslie J. Porter. 1996, Grandzol, John R., & Mark Gershon. 1998) and also (Quazi, Hesan A., et al. 1998, Chowdhury, Mesbahuddin, Himangshu Paul, & Anupam Das. 2007) who also stated valid and reliable instruments of quality management measurement in industrial as well as service firms.

### **BASIC PILLARS FOR TQM IMPLEMENTATION**

From the past research study, we have accumulated information about the establishment of TQM. A portion of the audits proposed four columns, while others propose nine columns for a fruitful execution of TQM. Be that as it may, we have picked 9 columns by embracing the rules of the researchers to distinguish the mainstays of

TQM execution, which are spoken to in Table-1. A concise depiction of every column is given a while later. That must note that the request for the columns set in the table doesn't speak to the general significance of the columns.

**Table I:** Pillars of TQM

No.	TQM PILLARS	Ref
1	Creation of quality management	Linderman, Kevin, et al. (2004)
2	Introduction of workers to Total Quality Management and Training Employees	Palo, Sasmita, and Nayantara Padhi. (2003)
3	Development of teamwork and promote cooperation	Kakkar, Subhash, & A. S. Narag. (2007)
4	Use of quality control tools and techniques	Bamford, David R., & Richard W. Greatbanks. (2005), Bunney, H. S., & B. G. Dale. (1997)
5	Involvement of frontline employees in decision-making	Chiu, Randy K. (1999)
6	Sharing information with everyone	Pun, K. F., K. S. Chin, & R. Gill. (2001)
7	Focus on customer satisfaction	Kakkar, Subhash, & A. S. Narag. (2007)
8	Benchmarking	Sweis, Rateb J., et al. (2016)
9	Continuous Improvement of the process and the goal	Chapman, Ross L, Paul Clarke, & Terry Sloan. (1991), Thiagaragan, T., M. Zairi, & B. G. Dale. (2001)

### *Creation of quality management environment*

This includes the assurance of a quality arrangement, making and executing quality arranging and confirmation, and quality control and quality improvement. Quality administration not just spotlights on the nature of items and administrations yet in addition on how they can be achieved. So every employee from top to bottom should know quality.

### *Introduction of workers to total quality management And Training Employees*

To implement Total Quality Management (TQM), all of the workers should have the basic knowledge about it. For this, there must be a grooming session or training so that they can use the TQM tools and techniques appropriately. As a starter, it can be done by organizing some workshops and seminars, then formal training sessions.

### *Development of teamwork and promote cooperation*

The main priority of any industry is to satisfy the customer and meet their needs. So they need to work together to achieve the goal. If all the employees in department work as a whole, they can easily detect a problem and provide a creative solution. On the other hand, they need to cooperate by helping them understand what their roles are. For achieving this, there should be communication between the employee, and there must be a sharing of information.

### *Use of quality control tools and techniques*

To improve the quality first, the representative needs to distinguish the right quality issues they have to utilize suitable devices and methods. In such manner, SPC(Statistical Process Control) is the best specialized apparatus that assumes a noteworthy job. It incorporates seven essential apparatuses in particular Pareto graph, Process stream outline, Cause-and-impact outline, Check sheets, Histogram, Control graphs, and Scattered chart which will help to identify visually if their process is "in control" or "out of control" and when to take corrective action.

### *Front-line employee involvement in decision-making*

Quality is the responsibility of everyone. It can be beneficial for industry and employees to involve and empower employees in decision-making, as quality employees are the backbone of a smoothly run organization. Asking them for their opinions can give different perspectives to make better decisions. It can be done in three ways suggestion box, leadership team, and employee survey.

### *Sharing information with everyone*

Poor communication, vague instructions, and anticipations, poor attending skills, inaccurate data, lack of cooperation among team members of the various department can be very costly. This can lead the industry in making a decision which is based on a false assumption and unreliable data. So an Industry should be designed in a manner that obtaining reliable and fast feedback gets smooth.

### *Focus on customer satisfaction*

The primary and basic goal of an organization is to appease the customer. So the customer should be the priority of any industry. Quality is not only defined by durability, packaging, timely delivery, reliability, and so on but also a customer's total experience with the organization. The industry needs to understand their target customer well. On the other hand, customer feedback should be monitored carefully.

### *Benchmarking*

Benchmarking is a methodical, continuous technique by which an industry can compare its performance with another industry, which is considered to be standard. Simply benchmarking is learning from others. Companies use benchmarking to analyze the performance and identifying the strengths and weaknesses of the company and what needs to make Improvement.

### *Continuous Improvement of the process and the goal*

TQM is a never-ending approach. It aims to ensure that all of the employees of the industry feel consistently empowered to improve efforts, results. Most writers favor a

'zero defect' and a 'do it right the first time' stance towards the quality system, which requires a zero-defect mindset of the workers.

### ANALYSIS OF PRODUCT QUALITY

Define the Defects Name: In garments industries, the defects that lead to rework and reduces the efficiency are slanted/un-even stc, open stitch, pleat, broken stitch, skip a stitch, down stitch, up down parts, raw edge, O/L broken, joint stitch, puckering, wrong placement of Velcro bartack, bartack attach, missing bartack, bartack broken, stitch missing, needle mark, dirty spot, oil spot, etc.

Data Collection (Frequency of Defect): We have used a structured check sheet for our data collection purpose, which contains the frequency of defects. The check sheet, also known as the "Defect Concentration Diagram," is a data collection sheet (<https://asq.org/quality-resources/check-sheet>). Those defects have not occurred in the same frequency; some of the defects occur very frequently and some less frequently. For analyzing purposes, we have collected Defect Name and Defect Qty. from the selected garments industry.

**Table II:** Defect Name and Defect Qty.

Defect Name	Defect Qty.
Broken Stitch	4225
Un-Trimming & Loose Thread	7342
Skip Stitch	5879
Insecure Stc.	3342
Slanted/Un-Even Stc	4380
Open Stitch	3689
Pleat	2433
Skip Stitch	3389
Down Stitch	879
Up Down Parts	2995
Raw Edge	785
O/L Broken	1342
Puckering	2787
Join Stitch	1795
Placement of Velcro Bartack	335
Missing Bartack	551
Bartack Broken	986
Needle Mark	182
Dirty Spot	77
Oil Spot	58

### ANALYSIS WITH TQM TOOLS

Pareto graph: Pareto outline, otherwise called Pareto examination, is a factual method in dynamic that is utilized for the determination of a predetermined number of

undertakings that produce a critical by and large impact. The Pareto guideline (otherwise called the 80/20 standard, the law of the fundamental few, or the rule of factor sparsity) expresses that, for some occasions, generally 80% of the impacts originate from 20% of the causes (Bunkley, Nick. March 3, 2008, Box, George E.P.; Meyer, R. Daniel. 1986).

All the information gathered by the check sheet has been plotted in the Pareto graph and found the 20% deformities that cause 80% issues. The 20% deformities are broken join, Un-cutting and free string, Insecure stc, and so on (Bunkley, Nick. March 3, 2008, Box, George E.P.; Meyer, R. Daniel. 1986).

Pareto analysis on defect at after QC DFU FA AUDIT has shown us that the first 3 Cause/Contributor cover 85.45% of the Total Defect Qty. Those causes which contribute such high frequency of defects are broken stitch, Un-trimming & loose thread, Insecurity.

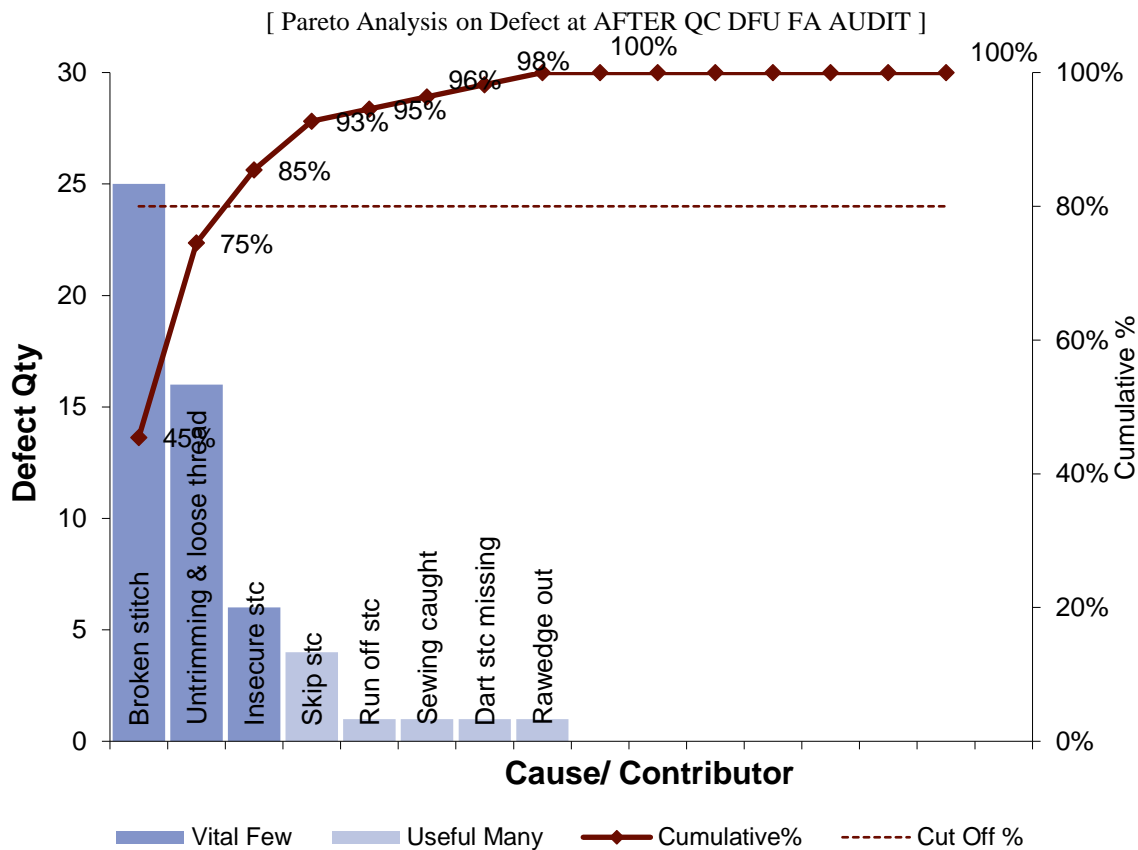


Fig. 1. Pareto Analysis on Defect at AFTER QC DFU FA AUDIT

Process flow charts are holistic tools that show the relationships of all the steps in the process by highlighting the major steps. It helps to understand how a process is done and identify and also to study a method for Improvement. Flow chart of sewing & QA is given below:

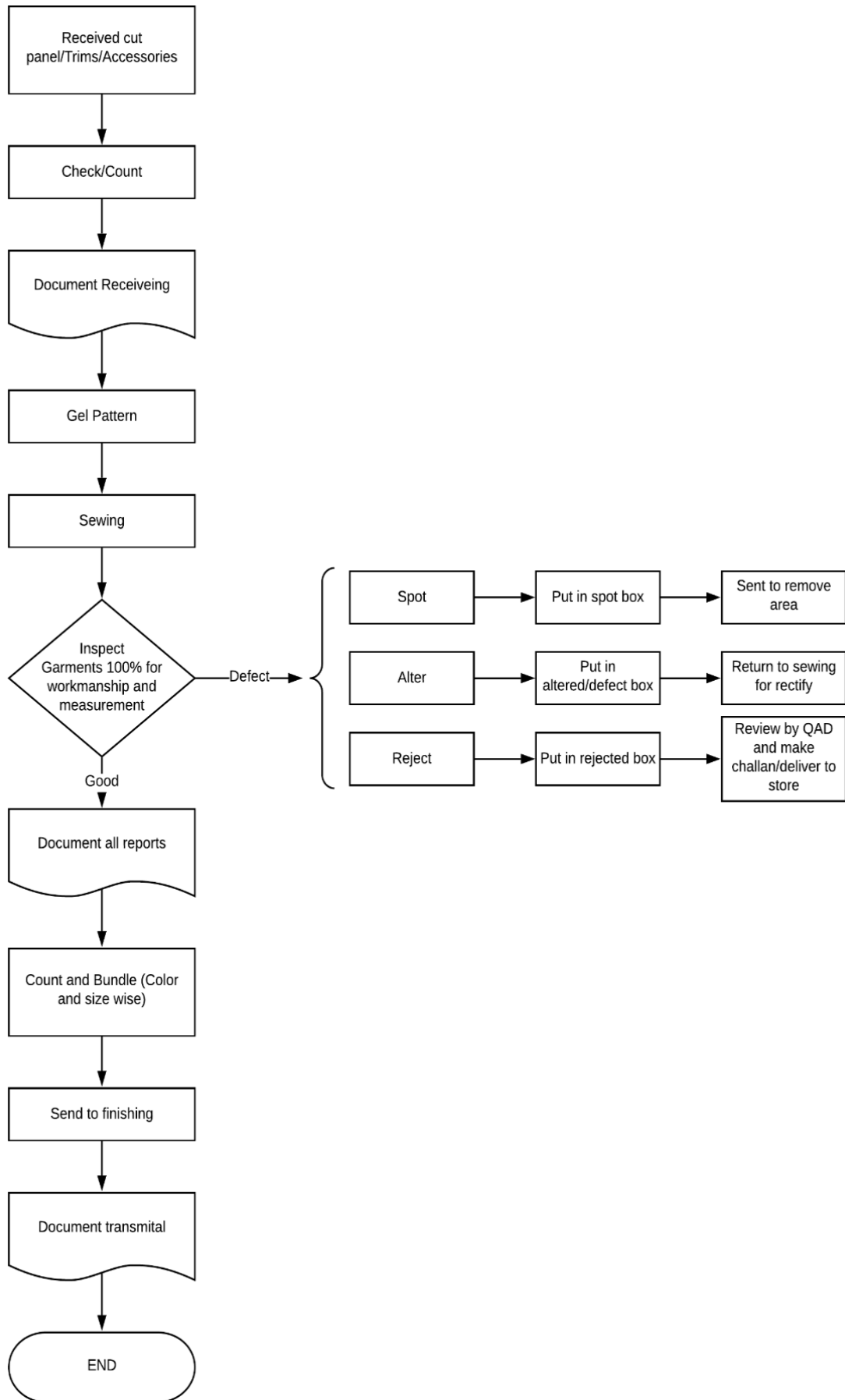


Fig. 2. Flow chart of Sewing & QA

Flowchart of cutting & QA is given below:

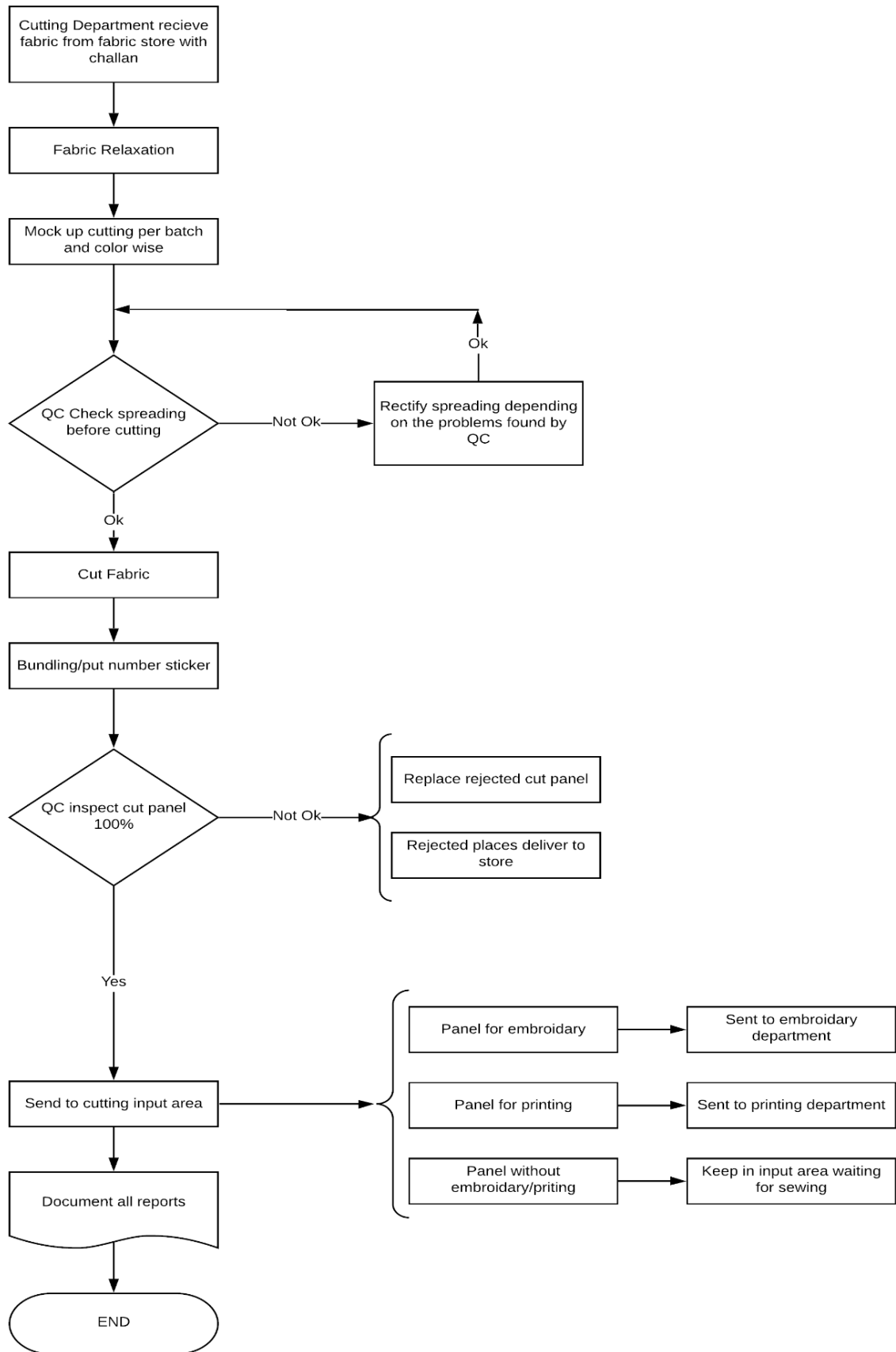


Fig. 3. Flowchart of Cutting & QA

**Cause-Effect Diagram:** A visual tool to display in a graphical manner the causes that relate to all the steps to get to the root of the issue. These are commonly known as fishbone diagrams. This study uses production process anomalies like man, machine, method, materials, measurement, and environment. The problem with machines can be attributed to configuration where problem with worker can be attributed to the lack of training or other factors like fatigue.

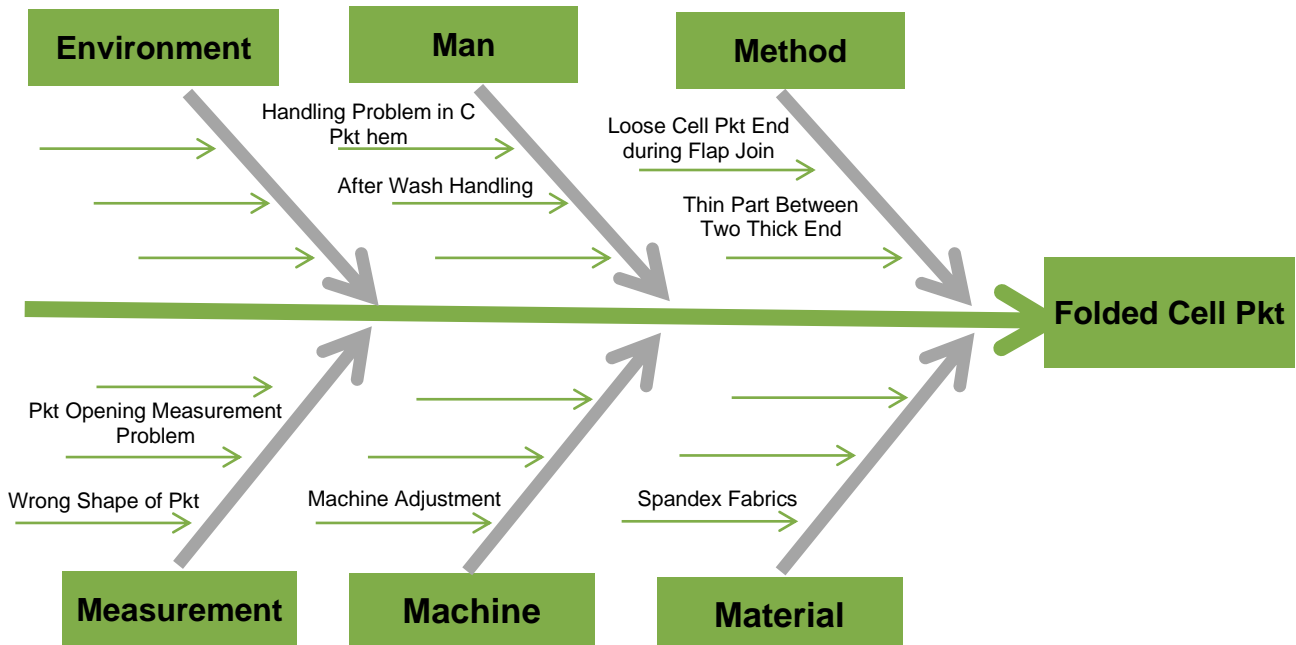


Fig. 4. Cause and effect diagram of Folded Cell Pkt

**Control Chart:** Control chart exhibits the changes in process overtime with a central line as the target performance with two more lines as upper and lower control limits. The data collected determines these lines and conclusions are drawn on the basis of variations in these lines as they represent predictable or unpredictable changes. Fig. 5 depicts that the process of Measurement Capability Analysis (Waist) is in control.

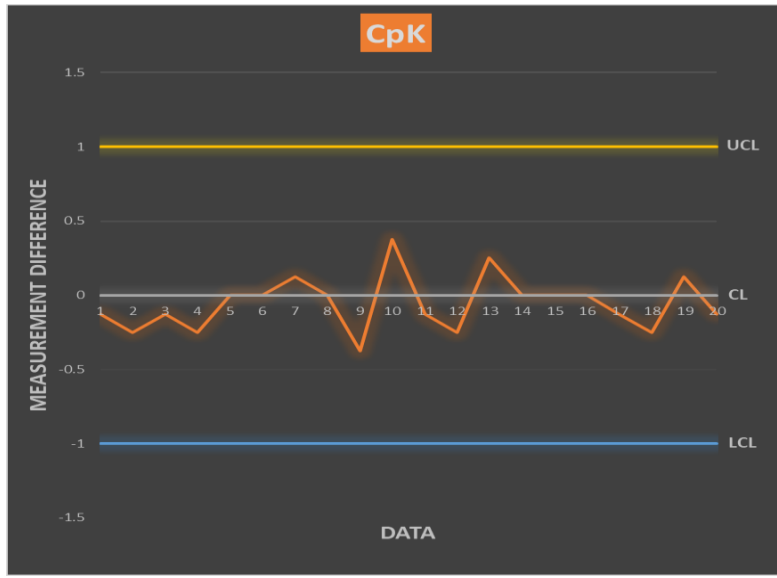


Fig. 5. Measurement Capability Analysis (Waist)

**Bar Chart:** Presentation of categorical data with bars in rectangular shape whose length represents the values is known as a bar chart. Fig. 6 depicts that the total weekly irregularity of defect where scratch of sewing having the prominent 43.22% percent of weekly irregularity.

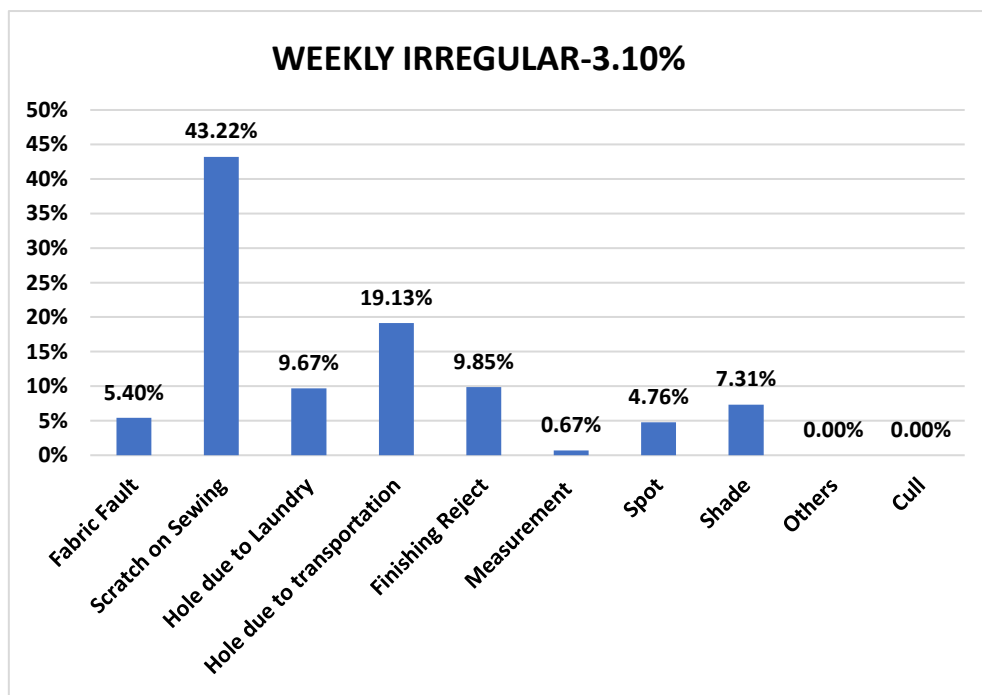


Fig. 6. weekly irregularity of defects

## IMPLEMENTATION

The phases of implementation start with establishment of pillars and then implementation of tools for improvement in quality.

### *Quality management environment creation*

We have organized some workshops on the essential knowledge of total quality management. All of the workshops were divided into many sessions. It covered all of the workers from top management to employees because everyone in the industry should know quality.

### *Introduction to total quality management And Training Employees*

The introduction of workers to the tools and techniques that are required to improve quality has been done. They are trained with seven total quality management tools and techniques. They understand the philosophy of Total quality management.

### *Development of teamwork and promote cooperation*

We have eliminated the blaming each other and started teamwork. This means working for a solution when a problem arises. We have started a reward system. This will encourage the employees to work harder for Improvement.

### *Use of quality control tools and techniques*

Employees are trained to use seven Statistical Process Control tools and techniques. Now they can use them to improve quality.

### *Involvement of frontline employees in decision making*

We started taking ideas about different problems from frontline employees. It created a various perspective on a particular problem. As a result, we found various ways to solve a problem or improve quality.

### *Sharing information with everyone*

We have started a team approach. Divided the employees into several groups in which each and everyone knows their roles. This will help them to solve a problem properly more accurately.

### *Focus on customer satisfaction*

We trained the employees on how to take customer's feedback and make them realize how important customer satisfaction is. So now the main motto is to take customer's needs and meet them appropriately.

### *Benchmarking*

We started Benchmarking so that we can compare our products and process versus industry leaders in this sector.

### *Continuous Improvement of the process and the goal*

We set an improvement goal every two months for the persistent Improvement of processes and products.

## RESULTS

**Table III:** Result Analysis after TQM implementation

Area	Before Implementation	After Implementation	Improvement
Defect %	13.38	6.23	53%
Repair/Rework %	8.45	4.75	44%
Reject/Scrap %	1.33	1.02	23%
Quality %	84.15	91.22	8%
Efficiency %	41.55	50.85	18%
Team Approach	Not strong	Stronger than previous	Improved
Reward System	No	Yes	Improved
TQM Knowledge of workers	No	Yes	Improved

The base level percentile value improvement is shown in the above table (before TQM implementation)

## CONCLUSION

TQM is a way of running organizations that is a continuous process based on principles that are systematic in nature, it has a proven track record and cannot be ignored like a management fad. To survive an organization in today's competitive market, they need to give importance to continuous improvement in their product and quality and process regarding fulfilling customer satisfaction. In this paper, we tried to discuss several pillars of Total Quality Management and how an organization should implement TQM and how to improve quality by implementing it in the garments industry. Though it is not easy to implement TQM in an organization, it will take time and some extra effort from everyone. In our study, we found that the implementation of TQM is productive, and it improves quality. In light of today's circumstance, it is clear that every organization is trying to take a competitive advantage. So to be in the competition and to compete, there should be no compromise of quality, and there must be the continual improvement of product and processes.

### Reference:

- Ahire, Sanjay L., & Paul Dreyfus. (2000). "The impact of design management and process management on quality: an empirical investigation". *Journal of operations management*. 18(5). 549-575.
- Anderson, John C., Manus Rungtusanatham, & Roger G. Schroeder. (1994). "A theory of quality management underlying the Deming management method". *Academy of management Review* 19(3). 472-509.
- Badri, Masood A., Donald Davis, & Donna Davis. (1995). "A study of measuring the critical factors of quality management". *International Journal of Quality & Reliability Management*. 12(2). 36-53.

- Bamford, David R., & Richard W. Greatbanks. (2005). "The use of quality management tools and techniques: a study of application in everyday situations". *International Journal of Quality & Reliability Management*. 22(4). 376-392.
- Black, Simon A., & Leslie J. Porter. (1996). "Identification of the critical factors of TQM". *Decision sciences*. 27(1). 1-21.
- Box, George E.P.; Meyer, R. Daniel (1986). "An Analysis for Unreplicated Fractional Factorials". *Technometrics*. 28 (1). 11–18. doi:10.1080/00401706.1986.10488093.
- Bunkley, Nick (March 3, 2008). "Joseph Juran, 103, Pioneer in Quality Control, Dies". *New York Times*. Archived from the original on September 6, 2017. Retrieved 25 January 2018.
- Bunney, H. S., & B. G. Dale. (1997). "The implementation of quality management tools and techniques: a study". *The TQM Magazine*. 9(3). 183-189.
- Chapman, Ross L., Paul Clarke, & Terry Sloan. (1991). "TQM in continuous-process manufacturing: Dow-Corning (Australia) Pty Ltd". *International Journal of Quality & Reliability Management*. 8(5). 77-90.
- Chiu, Randy K. (1999). "Employee involvement in a total quality management programme: problems in Chinese firms in Hong Kong". *Managerial Auditing Journal*. 14(1/2). 8-11.
- Chowdhury, Mesbahuddin, Himangshu Paul, & Anupam Das. (2007). "The impact of top management commitment on total quality management practice: an exploratory study in the Thai garment industry". *Global Journal of Flexible Systems Management*. 8(1-2). 17-29.
- Evans, James R., & William M. Lindsay. (1999). "The Management and Control of Quality. Cincinnati." OH: South-Western College Publishing.
- Flynn, Barbara B., Roger G. Schroeder, & Sadao Sakakibara. (1994). "A framework for quality management research and an associated measurement instrument". *Journal of Operations management*. 11(4). 339-366.
- Gomes, I., et al. (1999). "Hardy–Weinberg quality control". *Annals of human genetics*. 63(6), 535-538.
- Grandzol, John R., & Mark Gershon. (1998). "Which TQM practices really matter: an empirical investigation". *Quality Management Journal*. 5(3). 43-59.
- Hakes, Chris, ed. (1991). *Total quality management: the key to business improvement*. Springer Science & Business Media.
- Hashmi, Khurram. (2007). "Introduction and implementation of total quality management (TQM)." *Journal of electronics and Quality Management*. 6, 45-57.
- José Tarí, Juan. (2005). "Components of successful total quality management". *The TQM magazine*. 17(2). 182-194.
- Kakkar, Subhash, & A. S. Narag. (2007). "Recommending a TQM model for Indian organizations". *The TQM Magazine*. 9(4). 328-353.
- Linderman, Kevin, et al. (2004). "Integrating quality management practices with knowledge creation processes". *Journal of Operations Management*. 22(6). 589-607.
- Miller, William Johnson. (1996). "A working definition for total quality management (TQM) researchers." *Journal of Quality Management* 1(2), 149-159.
- Oxford Talking Dictionary. (1998). *THE LEARNING COMPANY, INC.*, London.
- Palo, Sasmita, and Nayantara Padhi. (2003). "Measuring effectiveness of TQM training: an Indian study". *International Journal of Training and Development*. 7(3). 203-216.

- Powell, T.C. (1995). "Total quality management as a competitive advantage: A review and empirical study." *Strategic Management Journal*. 16, 15-37.
- Pun, K. F., K. S. Chin, & R. Gill. (2001). "Determinants of employee involvement practices in manufacturing enterprises". *Total Quality Management*. 12(1). 95-109.
- Quazi, Hesan A., et al. (1998). "Critical factors in quality management and guidelines for self-assessment: the case of Singapore". *Total quality management*. 9(1). 35-55.
- Saraph, Jayant V., P. George Benson, & Roger G. Schroeder. (1989). "An instrument for measuring the critical factors of quality management". *Decision Sciences*. 20(4). 810-829.
- Sitkin, Sim B., Kathleen M. Sutcliffe, & Roger G. Schroeder. (1994). "Distinguishing control from learning in total quality management: a contingency perspective". *Academy of management review*. 19(3), 537-564.
- Sweis, Rateb J., et al. (2016). "Benchmarking of TQM practices in INGOs: a literature review". *Benchmarking: An International Journal*. 23(1). 236-261.
- Thiagaragan, T., M. Zairi, & B. G. Dale. (2001). "A proposed model of TQM implementation based on an empirical study of Malaysian industry". *International Journal of Quality & Reliability Management*. 18(3). 289-306.
- Total Quality. (1992) KOGAN PAGE LIMITED, London.
- Zhang, Zhihai, A. B. Waszink, & Jacob Wijngaard. (2000). "An instrument for measuring TQM implementation for Chinese manufacturing companies." *International Journal of Quality & Reliability Management*. 17(7), 730-755.
- <https://asq.org/quality-resources/check-sheet>
- [https://en.wikipedia.org/wiki/Bar\\_chart](https://en.wikipedia.org/wiki/Bar_chart)